THE GLACIERS OF NORTH AMERICA.

Glaciers of North America: a Reading Lesson for Students of Geography and Geology. By Israel C. Russell, Professor of Geology, University of Michigan, Pp. x + 210. (Boston, U.S.A., and London: Ginn and Co., 1897.)

A GOOD summary, in a convenient form, of what has been ascertained about North American glaciers, has been for some time a desideratum. Prof. I. C. Russell has supplied it in a volume of moderate size, well illustrated, and written in a cautious and critical spirit. As he points out in his opening words, North America, in reality, affords more favourable conditions for the study of existing glaciers and the records of ancient ice-sheets than any other continent. It affords excellent examples of the three types into which glaciers may be distinguished—namely, Alpine, Piedmont, and Continental. Of the first, specimens are abundant in the mountain system of the West, from "pocket editions" in the peaks of the High Sierra to the huge Seward glacier in Alaska. The latter region also supplies good instances of the Piedmont type, in which, as the name implies, the ice-streams of mountain valleys become confluent on a lowland; while Greenland is a grand case of the "Continental" ice-sheet. Of each of these types Prof. Russell gives careful and lucid descriptions, in the course of which he notices or discusses the more important phenomena of ice action. We must confine ourselves to mentioning only two or three, which bear more especially on general questions. We observe that he draws a distinction between osars and kames, applying the former term to continuous ridges, often many miles long; the latter to irregular hills with basins between. Both are mainly composed of water-worn materials, and are connected with ice-sheets; both exhibit stratification, more or less oblique and cross-bedded; on the surface of both large angular blocks have often been dropped, but the osar, he thinks, has been formed by streams flowing in sub-glacial channels; the kames, by deposition in cavities beneath the ice or in open channels on its margin. Prof. Russell also gives an excellent account of drumlins, those curious elongated mounds, mainly composed of "till," which are among the ice-age puzzles. Of these he suggests as a "working hypothesis" the following explanation. Débris embedded in an ice-sheet tends to impede its movement. If, then, any portion of the latter, owing to local causes, contains an exceptional amount of adventitious material, it may behave in some respects as a large boulder (which, however, is gradually stretched out), the purer ice flowing past and around it. Then at last it may be stranded near the end of the sheet. The contained ice slowly melts, and leaves behind an elongated mound of "till." The hypothesis explains several facts, but is not without its own difficulties, on which, however, we must not enlarge. It is certainly ingenious, and it deserves careful consideration. He gives an excellent description of the Malaspina Glacier, one of the Piedmont type, in Alaska. In its neighbourhood marine shells are found embedded in a boulder deposit, high above sea-level. Prof. Russell does not think it necessary to employ an ice-sheet to bring these shells inland from the bed of the Pacific, and remarks that they indicate very considerable upheaval in quite late geological times. We commend this part of the volume to those glacialists of Britain who repudiate almost with scorn the possibility of an important submergence at a date so recent as the glacial epoch. Perhaps in future we shall hear less of rampant ice-sheets at Gloppa and Moel Tryfan!

As regards Greenland, a good summary is given of the observations of Peary, Nansen, Chamberlin, and others, as well as some excellent and extremely suggestive remarks about buried masses of ice in Kotzebue Sund. We should not, however, be quite so ready to admit the possibility of the central ice in the former country being almost as thick as its surface is high above the sea. Surely it more probably conceals a country similar to, but on a larger scale than, Scandinavia, in which case the watershed would be towards the middle. There is a very clear summary of the diverse views on glacial physics. Prof. Russell concludes these by an "eclectic hypothesis," in which a tinge of sarcasm, perhaps unconscious, seems perceptible. May not the difficulties of the subject be augmented by defective knowledge and an imperfect terminology? Fluid and solid are necessary distinctions in practice and in mathematics, but we cannot be so sure where the border-line lies, how far it depends on circumstances, or even if it has a real existence. But we must conclude. We may hesitate in accepting Prof. Russell's conclusions on one or two points, but not in heartily thanking him for this clearly-written volume, which ought to find a place on the book-shelves of every student of ice and its work.

T. G. Bonney.

OUR BOOK SHELF.

Hydraulic Machinery. By R. G. Blaine. Pp. viii + 383. (London: E. and F. N. Spon, Ltd., 1897.)

The term hydraulic machinery is generally confined to the machinery employed for storing up water under pressure, the arrangements for transmitting this power to a distance, and the various machines worked by means of the water pressure thus provided; and the utilisation of this form of power was mainly initiated by Lord Armstrong, whose portrait is given at the commencement of the book. This application of power has proved very serviceable for the intermittent operations required at docks, such as the working of dock gates, swing bridges, lifts, coal hoists, cranes, and capstans, and for raising passenger lifts, large canal lifts, and hydraulic graving docks. Moreover, hydraulic power has been very advantageously employed for various operations on board ship, namely, loading and discharging, steering, the working of big guns, and the movement of turrets; and it has furnished a very rapid and efficient means of riveting. Accordingly hydraulic machinery, as commonly understood, has a wide range; but the author has treated it merely as an important branch of a still wider subject, relating to the flow and measurement of the discharge of water, and the various machines in which water is an active or a passive agent. Only ten sections, out of the thirty-one into which the book is divided, comprising about 170 pages, are devoted to hydraulic machinery in its limited sense; and the rest of the book deals with the general principles of hydraulics, the hydraulic press, hydraulic jacks, the flow of water from orifices through pipes and in open channels, the methods of measuring discharge including water meters, jets, water wheels, turbines, pumps, and hydraulic rams and brakes. The book is illustrated by 272 clear figures and diagrams in the text, and is provided with a suitable

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index. Though the book covers too wide a field to afford a thorough treatment of special subjects, it furnishes a useful, concise introduction for students to the general principles of hydraulics, and the machines relating to water.

The Story of the Chemical Elements. By M. M. Pattison Muir, M.A. Pp. 189. (London: George Newnes, Ltd., 1897.)

THIS book forms one of a series constituting a "Library of Useful Stories," and the object of the author has been to "put forth in some kind of orderly sequence a few of the chief guiding conceptions of chemistry" as exemplified by familiar things and phenomena. Mr. Muir deals with his subject in a philosophical spirit, but we fear he assumes too much of the same spirit in his readers for the book to prove really attractive to people unacquainted with chemistry. It is difficult to expound the elements of chemistry otherwise than by experiment—impossible, in fact, to do so satisfactorily—and we should imagine that the readers for whom the book is intended are of the kind that require very careful wooing. Nearly one quarter of the book is devoted to carefully marking out the distinction between elements and "not-elements," and between physical and chemical change; and though much pains have been taken to interweave homely and attractive illustrations, we doubt very much whether the desired end will be reached. Distinctions of the kind in question cannot be said to be intrinsically interesting, and we think that the author exaggerates both their importance and the nicety of treatment required for the main purpose of his book. The task attempted by Mr. Muir is, as already remarked, a hard one, and when we recall the opinions which he has so often expressed concerning the right method of teaching chemistry, we cannot suppose the task to have been entirely congenial. A. S.

Physics: an Elementary Text-Book for University Classes. By Dr. C. G. Knott. Pp. vi + 351. (London: Chambers, 1897.)

IN taking up such a book as that of Dr. Knott's, one cannot help feeling that the attempt to treat such a subject as physics within the limits of a book of between three and four hundred pages, must be attended with extreme difficulty. When, on further perusal, we notice that this work contains references to such subjects as contours, determination of the mean density of the earth, the theory of the formation of mirages both erect and inverted—to mention only a few of those matters which the elementary text-book usually leaves out of consideration—we are struck with amazement. But though it might be said that Dr. Knott treats "*de omnibus rebus et quibusdam aliis*," he has succeeded beyond expectation in making his book not only readable but attractive. To one who has read the subject in other works, or who has attended a series of lectures, it will prove most useful as a help to revising his knowledge and giving him a general view of the whole science, which every year makes it more difficult to obtain; and we feel certain that many a student of physics will be grateful to Dr. Knott for furnishing him with such a useful compendium.

Le Déterminisme biologique et la Personnalité Consciente. By Félix Le Dantec. Pp. 158. (Paris: Alcan, 1897.)

THIS volume is a sequel of the author's "Théorie nouvelle de la vie," which was published last year. The most interesting feature of that theory was the doctrine that constructive activity of living substance was to be regarded as the chief accompaniment of work, while destruction of tissue took place chiefly during rest. In this work consciousness is regarded as an epiphenomenon which in no way interferes with biological determinism. The author assumes the existence of a molecular consciousness which arises from atomic consciousness, and, by a process of fusion, passes into plastidular consciousness, or that of the lowest living organic element. The consciousness of man or of the higher animals is regarded as the sum of the individual consciousness of the neurons of which the nervous system is composed, and is dependent on the arrangement of the neurons. Starting from these assumptions, the author adopts the views of Duval and Ramon y Cayal, and explains such modifications of consciousness as sleep and altered personality by differences in the relations of the neurons to one another.

Report of Observations of Injurious Insects and Common Farm Pests during the year 1896, *with Methods of Prevention and Remedy.* By Eleanor A. Ormerod, F.E.S., F.R.Met.Soc., &c. Pp. 160. (London: Simpkin, Marshall, Hamilton, Kent, and Co. Ltd., 1897.)

MISS ORMEROD'S reports are so well known among economic entomologists, that it is almost unnecessary to state that the latest of her valuable volumes (the twentieth) furnishes interesting and serviceable information upon the insect pests prominent in 1896. One of the worst insect attacks of the season was that of various kinds of caterpillars to leafage of forest and fruit trees. In various localities in Kent, Sussex, Surrey, Hampshire, and other counties, in May last, hundreds of trees were stripped of their leaves by caterpillars of the Oak-leaf Roller Moth, the Mottled Umber Moth, and of the Winter Moth. Miss Ormerod describes the life-histories of these pests, and the measures used to prevent the attacks. A very important account is given of the occurrence of "Onion-sickness," arising from the presence in the bulbs, of the Stem Eelworm, known in this country as causing "Tulip-rot" in Oat-plants, and "Stem-sickness" in Clover. Among other insect pests described, with the means of exterminating them, are the Codlin Moth—one of the yearly troubles of the fruit-grower; Beet Carrion Beetle, which has taken to feed on potato leafage; White Cabbage Butterflies, German Cockroach, Common Earwig, Caddis Worms, Pear and Cherry Sawfly, and Surface Caterpillars.

Miss Ormerod pays an affectionate tribute to the memory of her sister, whose death last August deprived her of a constant companion ever ready to assist her in the investigation and illustration of the life-histories of injurious insects.

Grasses of North America. By W. J. Beal. Vol. ii. Pp. 706. (New York: H. Holt and Co., 1896.)

THE first volume of Dr. Beal's "Grasses of North America" was published in 1887, and was a work intended more especially for farmers and students, comprising chapters on the physiology, composition, selection, improving, and cultivation of grasses and clovers. The present volume may be regarded as a separate work. It is confined to the Gramineæ, and constitutes a monograph of the North American grasses, native and introduced, with an illustration of each genus. Some idea of the magnitude of the task may be gathered from the fact that the native grasses alone of North America number about 1275 species, included in about 140 genera; while in Europe there are only 47 genera and 570 species. The author brings to his subject a wide practical knowledge, which will make the work of great value to systematic botanists. There is a useful chapter on the geographical distribution of North American grasses, and a copious bibliography is appended.

The Culture of Vegetables for Prizes, Pleasure, and Profit. By E. Kemp Toogood, F.R.H.S. Pp. 127. (Ulverston: William Holmes, 1897).

COTTAGE gardeners will find in this little volume many useful hints on varieties of alimentary plants, soil-working, rotation, manures, garden pests, and vegetable culture generally. The book is a trustworthy and practical guide, dealing with methods alone, little attention being given to the principles underlying them.

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